Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

DISCUSSION

QUANTITY, QUALITY, AND THE FUNCTION OF KNOWLEDGE

IN the *Monist* for July are two articles which raise an issue of categories that appears to be crucial in current philosophic method and aim, so that if there be a quarrel brewing in the speculative world here should be its incipience.

I

Oddly enough, in 'Quality and Quantity,' by Johannes Gros, the fundamental contention is taken as settled. 'The human mind knows only number adequately.' 'The mind only grasps fully and clearly that which is reducible to the terms of ratio.' 'We reduce our impressions to particular mathematical formulas, and simply by means of this reduction of a confused state to a clear idea, we manage adequately to grasp the real.' 'Science . . . simply affirms that the mathematical expressions in which it sets reality are to us the only condition of any perfect intelligibility.'

I quote these scattered statements to show the nature of the assumption which the author evidently considers self-evident, as 'founded on a necessity of the human mind,' although he incidentally supports it by appeal to the history and ideals of exact science.

The problem which the discussion formally sets is the reduction, so far as may be, of the category of quality to that of quantity. Quality is analyzed as the expression of a relation between two terms—the self, as a series of conscious states, and the external world, as the register or measure against which the self descries its own serial nature. Subjectively the sensational series is incapable of possessing any definite character; it is only by dint of its objective reference that it can even know itself as a series. This objective reference is the created external world, which is a kind of mirror of the self; it is the sensation series externalized, and therein lies its qualitative nature. But such a world is a palpable hypostatization. Hence, quality in things is illusion due to the need for externalizing a cause for sensation; all it yields is confusion replicating the uncertainty of subjective sensation.

Now the problem of knowedge is to clarify this confusion. On the basis of the underlying assumption (that the mind 'knows only number adequately') this means mathematical formulation. Physics, in postulating and describing a world of sensation-causes, gives such formulation. 'Objectively and scientifically, the external object is only our sensation measured in what we suppose to be its cause; it is the intensive expressed by the extensive.' What it amounts to is a kind of self-description with the subjective (confused) element eliminated. 'When we think that we are reducing external reality to a mathematical formula, it is nothing but ourselves that we are so reducing—ourselves rendering objective the product of our thought.'

The significant point is that we do this in the category of quantity, by measurement and equation. Science is an algebra of experience by means of which all that is meaningful is rescued from the inconstancy and turbidity of subjective sensation. Its numerical schematisms are the quantitative rendering of the series of qualitative haps that make up the first blush of life.

Hence: 'Quality, scientifically speaking, is a point of view relating to the exigencies of our body in its relation to external objects; it is in us the more or less confused feeling of something good or evil for our organism. Quantity is the irreducible point of view of thought in its effort to reflect and classify the world.'

II

The article in which the editor of the *Monist* replies to the foregoing can hardly be termed less than a brief for 'The Significance of Quality.' It is written with evident ardor and a will to vindicate. In behalf of the discredited category he makes a series of points: (1) That quality is a fact. (M. Gros denied only that it is a significant fact.) (2) That historically it plays an important rôle in the development of thought. (M. Gros but contends that the history of science tends to eliminate it.) (3) That after the last measurement is made there is still a residue of experience only to be described qualitatively; and indeed that qualitative classes play an important rôle in knowledge. Finally, (4) that the idea of unity is itself qualitative; 'a unitary complex is not merely a summation of its constituent parts; it contains a new factor which is not of a quantitative but of a qualitative nature, originating through the cooperation of its parts; and this new factor would not have been produced by any of its parts alone, but is the result of their mutual interaction.'

The two latter points are the ones of importance, and as the last explains and justifies the other, it alone need be considered. The gist of the interest lies in the fact that arrangement independent of quantity originates significance. Arrangement, the relation of part to part, is in fact the essence of quality; the nature of quality is 'always due to a definite configuration or structure, constituting a higher unity endowed with new and characteristic features of its own, not contained in any one of its several parts.'[1] And here we have one of the radicals of knowledge; for life, evolution, the universe itself, can not be comprehended except under the guise of such a complex unity. With none whatever increase or diminution of matter or energy, the world may very well suffer loss or gain of value just by the rearrangement of its constituent parts. The mere need of inclusiveness in our conceptions fortifies the position of quality among the categories.

III

It is evident that there is here a somewhat sharp divergence in the conception of the function and possibilities of knowledge. M. Gros is convinced that the only valuable knowledge is clear knowledge and that the only clear knowledge is mathematical. Dr. Carus esteems any knowledge incomplete which does not lead to what I may call motivating conceptions, that is, to conceptions possessing an attractive or inspirational character. The category of quality is lightly or largely valued accordingly.

The real issue, then (an issue which I conceive to underlie many differences of current philosophic thought), is not one of categories, but of the proper rôle of the rational in the manifold of experience. If one's interests be mainly logical or practical, the quantitative formulation will strongly appeal; for it is not to be doubted that the summarizing and predictive operations of thought are immensely facilitated by such process. But if one's instincts be ethical or esthetic, then the more imaginative and inciting category of quality will represent the preeminent type of knowledge.

Is this antagonism final? There are considerations which answer negatively, perhaps readiest to be reached through a discussion of certain moot points in the articles resumed.

1. Foremost: Is the assumption of M. Gros, that clear knowledge

---

[1] Dr. Carus's definition of quality is certainly open to objection. For in what category are we to think the parts which enter into the structure or establish the unity? They are not quantities; they can not be measured by the unit—except the indefinite axiom that a whole exceeds its parts be a type of measurement. In any case, if the unit have more than a relational quality, if it be more than relation, its parts must share its character—in which circumstance the quality would be theirs. Moreover, it is not beyond dispute that simple qualities may both be thought and be real. Hobbes's dictum, *idem semper sentire et non sentire ad idem recidunt,* is not wholly credible from the standpoint of an outsider debating the presence or absence of reality. At least it would seem that an intelligence, turning over possibilities of creation, might hesitate to pronounce an exquisite, all-engrossing agony ethically the same as no experience at all.

is essentially quantitative and mathematical, a justified assumption? It looks very much as if analysis would reveal here the personal equation, and, what is worse, a *circulus in probando* at the basis of his argument. For while the goal of his reasoning is to show that the external, physical world is clearly known only in mathematical schemata, the special intelligibility of mathematics he refers invariably to its implied translation in extension; geometry, he evidently conceives, is the ultimate norm of clear thinking. In other words, the only clear knowledge is of external (spatial) relations because spatial relations only can be clearly known.

However, the formalities of the reasoning are not to be quarreled with if the intuition upon which it is based have good warrant, and as such warrant the author's appeal to history must certainly serve. Yet granting (at least as a right of individual intuition to affirm) that the geometer's are the clear ideas, the primacy of the category of quantity is not thereby conceded. For it is the fairest of questions to demand wherein the clarity of these ideas consists, whether in extension as such, or in extensive relations, or in number and limit, or again in the sensuous forms of intuition whereby we first know space. Now in Euclidean space, at all events, it appears to the writer that it is indubitably in the sensuous intuition that the clarity exists, and a nice indication of the truth of this interpretation is the fact that, although we have two senses, touch and sight, whereby we perceive space, we rely almost exclusively upon one, sight, for those finer measurements which yield our exact knowledge. Indeed, it has been cleverly noted that the history of physical science might almost be phrased as the progressive conquest of the domains of the other senses by vision. *'Le langage de la vision des formes est celui qui s'applique directement au plus grand nombre des faits extérieurs connus; on peut presque dire que le langage scientifique n'est autre chose que le langage optique et que nous n'avons une idée claire des phénomènes, que quand ils se traduisent pour nous en langage optique. Aussi allons-nous voir que l'histoire de l'empiètement progressif du canton optique sur les autres cantons sensoriels peut être considérée comme l'histoire du progrès de la science.'*[2]

Manifest as is the support here given to M. Gros's favor for the geometer's knowledge, no less manifest is the defeat of his claim that this knowledge is primarily quantitative. Mensuration is largely translation of the acquisitions of the less specialized into the forms of understanding of the more specialized sense. The clarity of extensive quantity is the clarity of visual sensation. And this is saying that quantitative knowledge is essentially but a uniquely developed variety of qualitative knowledge, to which it refers for final intelligibility.

---

[2] F. Le Dantec, 'Les lois naturelles,' p. 37. Paris, 1904.

2. But extension does not exhaust the notion of quantity. Both time and gravity enter into many measurements, and, though the one may be recorded upon the dial of a clock and the other by the tilt of a steelyard, such translations are not invariable. Further, there are all sorts of complex relations inherent in number expression having no physical reference whatever.

If I may quote from the St. Louis address of Professor Royce:[3] "The idea of number, familiar as its applications are, does not derive its main value from the fact that eggs and dollars and star clusters can be counted, but rather from the fact that the idea of number has those relations to other fundamental ideas which recent logical theory has made prominent—relations, for instance, to the concept of order, to the theory of classes or collections of objects viewed in general, and to the metaphysical concept of the self."

Now in all of these various applications we get exact (that is, mathematical) knowledge which is by no means quantitative. Number itself, as mere counting, would appear ultimately to reduce to bare discrimination of *this* and *that,* to the primary abstraction of difference, which is certainly qualitative. A refinement of difference is limitation, which, with repetition, gives series and measurement, and here first we get true quantity, a greater and a less. But it is sufficiently obvious that even in measurement the qualitative reference is not escaped. The content of the unit, whether an etheric vibration, the beat of a metronome, or a bed of Procrustes, is what it is as determined by quality, and it is the content of the unit which gives the measurement significance.

In fine, the category of quantity is only a highly specialized development of quality, serving knowledge to peculiar advantage. All its embodiments partake of that individualism which is the earmark of quality. Triangularity is more than a special construction of straight lines and the golden section is more than a definite proportion. Indeed, mere direction derives its character from the ideal orientation of the body; thus, like measurement with its ideal repetitions, giving us knowledge by forming 'attachments' for foreign-seeming objects; that is, by imbuing them with familiar feeling-tones.

IV

Our conclusion, then, is that quantitative knowledge is a special case of qualitative, deriving its peculiar cogency from the capabilities and aptitudes of a particular sense, that of vision, or from relational ideas having a more or less direct reference to qualitative conceptions.

---

[3] 'The Sciences of the Ideal,' *Science,* October 7, 1904.

What follows from this is a generalization of some scope: the genesis of reason is to be sought in imagination; there may even be an eventual conformity of the ideals of these two faculties, an eventual identity of the true and the attractive.

Of course I would not wish to say that the mere fact of the genetic unity *necessarily* means the teleological unity of the mind's activities. But there are grounds for asserting that it *may* mean this. Human nature, with all its diversities, is still an organic whole; the condition of its being is the harmonic action of its parts. The mere fact of the enormously costly and cumbersome evolution of reason is guaranty of its biological value—of nature's sincerity in creating it for the whole organism. We all know the like value of the more ancient conative side of the mind. Have we not, then, warrant to suppose that the sapience of reason is vouchsafed for some better realization of those ideal satisfactions which the imagination so stoutly labors to supply? Certainly the fact that the chief category of our exact knowledge appears to be a direct specialization of the chief category of our imaginative, motivating, knowledge would seem to argue consistency in nature's intent.[4]

Such an interpretation might very possibly smooth over some philosophical antagonisms.

HARTLEY B. ALEXANDER.

SPRINGFIELD, MASS.

REVIEWS AND ABSTRACTS OF LITERATURE

Yale Psychological Studies,[1] New Series, Vol. I., No. 1. *Monograph Supplement, Psychological Review,* Vol. VII., No. 1, March, 1905. New York: The Macmillan Company. Pp. 226.

The various papers on the different illusions report a very interesting

---

[4] If illustration be needed, the history of music is in point. Here the distinction of the quantitative, or mathematical, and the qualitative, or artistic, ideal of the study of sound, is as ancient as Aristoxenus and the Pythagoreans. As M. Le Dantec notes (*op. cit.*, p. 34), the two interests have developed wholly diverse languages, that of acoustics, that of musical art. "Ces deux langages sont exactement equivalents; l'un d'eux est plus complet que l'autre; par example n'importe quel bruit sera justiciable de l'analyse acoustique et pourra être reproduit par un phonographe, tandis qu'il sera impossible de le définir en langage musical. Le langage musical est limité a un certain nombre de sons choisis par les hommes d'après le plaisir qu'ils trouvaient à les entendre, et ayant par conséquent un rapport indéniable avec la nature humaine; notre gamme fait hurler les chiens." In other words, the exact, comprehensive language is that of acoustics, but the significant utterance is that of music proper. The ends of the latter are those for which both interests work; improved musical instruments follow the researches of Helmholtz and Lipps; broadened esthetic appreciation ensues upon the theories and achievements of Wagner.

[1] The contributions in the supplement are as follows: 'Introduction to a Series of Studies of Eye Movements by Means of Kinetoscopic Photographs,'